E.No.99

EMERGENCY ENTOMOLOGICAL SERVICE.

UNITED STATES DEPARTMENT OF AGRICULTURE

Reporting cocperation between Federal, State and Station Entomologists and other Agencies.

Number 11. Washington, D.C. May 1, 1918.

CONTENTS.

FOREWORD.

It is very gratifying to note the responses to Doctor Howard's call for data for this first circular of the year 1918 The general tenor of all of the reports is that there has been considerable climatic control of insects during the past winter. It will be of great interest to watch the conditions this year with a view to determining, if possible, what that control has been compared with other years. Reports have been received from twenty-two states. It is hoped that the remaining states will submit data for the June bulletin.

Several of the entomologists who have entered the Sanitary Corps of the Army have expressed a desire that they be kept in touch with problems which are being met by other entomologists. In view of the fact that there are large concentrations of men in army camps in many parts of the country it is especially desirable that notes be made of the abundance of insects which affect the health of man and animals. In this way it will be possible to keep the sanitary entomologists of the various camps in touch with conditions and with the experiences of other workers so they can profit thereby. In order to make this service of the greatest value, commencing with the next number, all matter which is submitted along sanitary lines will be given a separate heading. Contributions from entomologists at the training camps will be welcome.

Special attention is called to the report of Mr.K.E.Bragdon on the sweet potato weevil as this contains mention of a new host plant.

W.D. Pierce.

REPORTS OF SECTIONS OF THE BUREAU OF ENTOMOLOGY.

TRUCK CROP INSECT INVESTIGATIONS.

Plant lice, always early spring arrivals, have been the subject of complaint in several localities. The cabbage aphis (Aphis brassicae Linn.) has been positively identified as injurious to cabbage and cauliflower in Alhambra, California, as early as January. The melon aphis (Aphis gossypii Glover) was reported injurious in southern California as early as March 21. The bean aphis (Aphis rumicis Linn.) was also injurious at Alhambra, California, in March.

Several complaints were made of ants, but in most cases probably aphides or plant lice were at work.

The bean leaf-beetle (Cerotoma trifurcata Forst.) was observed injuring cowpeas at Troup, Texas.

Cutworms were the subject of complaint in New Mexico, Illinois, Texas and Alabama. The first cutworms observed in the District of Columbia were taken by the writer on chickweed and were only about one-fourth grown.

The sweet potato weevil (Cylas formicarius Fab.) was observed by Mr. Charles E. Smith in Cherokee, Smith and Baldwin Counties in Texas. We have also received reports of its occurrence in foreign countries through Mr. George Compere.

An introduced species of maggot (Eumerus strigatus Fab.) was observed on onion at Forest Grove, Oregon, March 21 by Mr. Frank R. Cole. The imported cabbage maggot (Pegomya cepetorum Meade) also came under observation in the same locality. The onion thrips (Thrips tabaci) has been observed by Mr. H.J. Ryan in March on onions in different portions of California. From its abundance in a neglected greenhouse in the District of Columbia it seems probable that considerable infestation will occur this coming year in the field.

Note on Early appearing insects in the District of Columbia: Among the first truck crop pests which have come under observation this year is the spinach flea beetle (Disonycha xanthomelaena Dalm.). It was first noticed the second week in April, and was in great abundance by the 24th on chickweed.

The cabbage butterfly (Pontia Rapae Linn.) has been common since about the middle of March, but examination of cabbage leaves where the butterfly was present failed to disclose either larvae or eggs. The common squash bug (Anasa tristis DeG.) was observed April 23.

The rose aphis (Macrosiphum rosae L.) which is believed with reason to be identical with the potato aphis (Macrosiphum solanifolii Ashm.) is colonized in some numbers on roses and winged adult was seen as early as April 22. Numbers of predaceous insects have been observed, among them a common wasp (Polistes metricus) and a common carabid beetle or ground-beetle (Scarites subterraneus Fab.).

The onion thrips (Thrips tabaci Lind.) is found on parsley, the only food plant which would be likely to be favored at this time of the year. Some forms of plant lice or aphides other than that mentioned have appeared but are not identified. Some parasites of these are present.

F.H. Chittenden,
April 29, 1911.

Notes on the Sweet Potato Weevil in Florida:

I beg to submit the following report on my recent trip of investigation on the West Coast of the Florida Peninsula from April 17, to April 20, inclusive:

On the 17th I examined the infested seaside morning-glory vines at St.Petersburg, discovered by Mr.Popenoe and the writer December 12, 1917, and found the infestation decidedly active. While the cold weather of last winter had killed all vines down to the ground, the roots and new growth were heavily infested.

At Bradentown I examined a number of gardens finding active infestations. At one point I extracted 94 sweet potatoweevils in different stages from one sweet potato not over 2 inches in length. The potato resembled a sponge in texture. No seaside morning-glory vines located in immediate vicinity.

On the 18th I proceeded to Anna Maria. Cylas formicarius was easily located on Ipomoea pes-caprae at many points on this Island, but it was only after considerable searching that I finally located one weevil in a sweet potato patch. This was at a point where "standovers" had been grown for seven years. The nearest seaside morning-glory vines were about one-half mile distant and were heavily infested.

On the 19th I located the weevil in seaside morning-glory vines along the water front at Palmetto,Florida. Anna Maria, Bradentown and Palmetto are all,located in Manatee county.

On the 19th at Punta Gorda I found the weevil on Calonyotion bona-nox L. identified by Mildred Nathnagle of the Florida Experiment Station. The roots of this plant which are fleshy and about 1 inch in diameter, were found to be heavily infested but no weevils could be found in the vine itself although some of the stems were as large as one-half inch in diameter. This morning-glory vine has long trumpet-shaped leaves. It was climbing over a small bush. Heavy infestation on Ipomoea pes-caprae at this point also and light infestation on sweet potato also. Punta Gorda is in DeSoto County.

On the same date heavy infestation of Ipomoea pes-caprae was located on the coast at a point in Lee County known as "Burnt Store", about 16 miles south of Punta Gorda. A light infestation on sweet potato was located about three quarters of a mile inland from this point, exact location is section 13, township 43, range 23.

From what has been observed during this and previous investigations the writer is of the opinion that certain varieties of the morning-glory, particularly the seaside morning-glory (Ipomoea pes-caprae) are preferred host plants of the sweet potato weevil. Heavy infestations have been found in these plants when it would often be impossible to find the weevil in sweet potato plantings close by, even when these plantings were "stand overs" of several years duration. It seems possible that the seaside morning-glory might be used as a successful "catch crop" along the costal regions where the sweet potato weevil now abounds.

While infestations in sweet potato plantings are sometimes light in localities where morning-glory vines are abundant, yet I believe that rigid quarantine against shipments of vines or sweet potatoes from such points to the interior should be enforced, since such vines are quite

capable of spreading the weevil to points where there are no natural "catch crops" and where the damage to sweet potatoes would be very great.

K.E.Bragdon,
Gainesville,Florida,
April 23,1918.

Truck Crop Insects in Louisiana:

Following an unusually severe winter, February was unusually warm and the spring planting of truck crops was on this account done earlier than usual. Since February, however, there have been periods of cool weather. Rather severe hail storms on April 4 and 5 did considerable damage to truck crops, such damage being noted by the writer in the vicinity of Baton Rouge and New Orleans. There were light frosts during the week of April 7-14 that did some damage in the trucking sections.

An unusual thing in the writer's experience in the state has been the large number of complaints of injury by the sow-bug, (Armadillidium vulgare Latr.) to various young vegetable plants in the southern part of the State. Complaints of injury to beans, just as they were breaking through the ground, have been numerous. Various remedies have been reported to have been tried but it would seem that at least most of these did not give successful results.

The acreage planted to Irish potatoes is unusually large and there have been complaints of injury by the Colorado potato beetle (Leptinotarsa decemlineata Say).

There have been reports of injury to beans by what was apparently the bean leaf-beetle, Cerotoma trifurcata; to onions by thrips, and to various truck crops by aphids and cutworms Some of these complaints came from people who have war gardens where oftentimes the plants are growing under conditions that are far from ideal.

In the commercial truck gardens it seems, generally speaking, that insect injury has not been severe.

April 16 the writer accompanied Mr.Ed.Foster to the plane of a trucker in the suburbs of New Orleans and found that the severe injury to the leaves of table beets of which he had complained was due to a flea-beetle, Disonycha mellicollis Say, which the writer had not heretofore observed to cause severe injury in the State.

Thos. H. Jones,
April 18, 1918.

Injurious insects at Wichita, Kansas.

The first half of April has been cool and moist, with chilly nights, and one or two sharp frosts. The coolness has not interfered much with field work nor with the growth of early crops. Early garden crops, such as peas and radishes are now well along, and potatoes are up. Some venturesome gardeners are starting tender crops. Gardening this year will probably occupy a greater area and be better done than ever before in this city and vicinity.

Cutworms are scarce as before stated; however, a number are being found. Such as have been brought in for rearing are unusually voraceous. In one locality, where careless farming methods favor their increase, many cutworms have been found. They are injuring early cabbage here. In other places visited few can be found and no damage has been seen, hence it seems likely that cutworm injury will be small this year. Those used for rearing are eating much and growing fast but are not maturing as yet.

The strawberry leaf-roller (Ancylis comptana) has matured in the insectary, the first adult appearing early in April. Eggs are now being deposited. The species is scarce in the field at present, but undoubtedly has wintered successfully. Observations will soon be made in other places than Wichita, as few strawberries are raised here.

No aphides have appeared as yet. Adults of Pontia rapae appeared late in March and oviposition was observed April 11. Numbers of live adults of Leptinotarsa decemlineata have been exposed by cultivation, but only one adult has been active as yet. These two species have evidently wintered in numbers in spite of the severe conditions. No eggs of Leptinotarsa nor larvae of Pontia have been seen so far. Lygus pratensis is active and abundant on alfalfa and weeds. Few moths of any species have been seen flying.

Garden work has been continued. Field work and rearing work are beginning to occupy considerable time. A plot of one-third acre has been cleared and plowed to be planted to squashes and pumpkins in May. This plot will be used for testing spraying against the squash bug Anasa tristis both as to effectiveness and profitableness.

F.M. Wadley,
April 16, 1918.

Report of Spreckels Station, Spreckels, California.

Experiments with the beet leaf-hopper (Eutettix tenella Baker). During the course of experiments with different conditions of temperature and humidity one complete brood of this species has been reared. Some rather interesting comparisons were obtained. Under normal conditions outside the spring brood has not advanced further than the second nymphal instar which is about normal for this district.

Experiments which have been conducted for some time to determine the preoviposition period of this leafhopper will be repeated as soon as adults of the spring brood can be obtained. Material used was from the fall brood of last season. Seventeen days is the time determined so far for this period.

The incubation period for the disease under outside conditions has been an average of 14 days, about 4 days longer than during the most favorable period of the summer. Experiments have been in progress for some time to determine whether virulent insects will retain their virulence for any length of time when feeding continually on a plant that does not harbor the virulence. No definite results have been obtained as yet.

Other investigators have often said that the dark winter forms

of this insect take on a much lighter color in the spring. No careful observations along this line have been made but a number of exceptions have been noted from time to time. Recently a series of cages have been started each cage containing a number of very dark winter forms and placed on different plants. If feeding has any influence in the color it should be noted in these experiments.

Doctor Carsner has recently returned from a trip through the San Joaquin Valley during which careful observations were made and a search for beet leafhoppers. Not a single specimen was found although a few scattering cases of curly-top were noted in some localities. In the spring of 1915 and also 1916 these insects were found quite abundantly in some localities in this valley. The fact that the season over there is much later this year than usual and the vegetation is not growing very well as yet may account for this. Doctor Severin however reports this species of leafhopper to be very abundant in the Imperial Valley especially near Niland, California, where it is breeding on the wild vegetation. Asfar as I know there have never been any sugar beets planted within miles of this place.

Potato tuber moth parasites (Habrobracon sp.) About twenty-two days are required for a brood of this species at the present time and considerable material is being accumulated.

The beet root aphis (Pemphigus betae Doane). The galls suspected of being those formed by this species have increased in numbers on the cottonwood tree under observation. A large number have been tagged and the development will be noted. As soon as the aphids are mature they will be collected for identification.

C.F.Stahl.
April 18, 1918.

CEREAL AND FORAGE INSECT INVESTIGATIONS:

Hessian fly: According to information received from Mr.J.J. Davis, the Hessian fly began emergence at Nashville, in southern Illinois, on April 1,which is more than a week earlier than the date of emergence for 1917. In southeastern Missouri the Hessian fly was in flight on the morning of March 18, and the eggs were found by Mr.Satterthwait on volunteer wheat March 20, in the neighborhood of Charleston, Mississippi County. The Hessian fly situation at the present time throughout the principal winter wheat-producing areas of the West appears to be most encouraging. The insects are scarce and the indications are that unless conditions change materially within the next few weeks, little damage is to be expected from the Hessian fly as regards the winter wheat crop of 1918.

Joint worms are much more abundant and injurious at the present time than the Hessian fly throughout the more southerly portions of the winter wheat belt. This applies particularly to that portion of the belt extending from southern Missouri easterly. It has been determined by the investigations carried on by the Bureau that this pest can be controlled by plowing down stubble as soon after harvest as is practicable, but it has been deemed inadvisable to make such recommendations

at the present time, because of the danger of discouraging the planting of red clover a shortage of which already exists in the country. The fact that red clover is quite generally sown on wheat stubble would interfere with the proposed control of the joint worm by plowing down stubble in the late summer or early fall in many states, but it is obvious that the joint worm can not be controlled until the practice of summer or early fall plowing is generally adopted. It is to be hoped that in the future suitable rotations can be evolved which will not interfere with the growing of red clover or the maintenance of the fertility of the soil, and at the same time permit the destruction of wheat stubble by plowing under soon after harvest, particularly in those regions most seriously affected by joint worm and Hessian fly.

Mr. C.M.Packard reports the presence of the straw worm in the wheat sections of Siskiyou County, California, under date of March 19.

Chinch bug: Mr. H.B.Parks,Extension Entomologist for Texas, reports the chinch bug situation in Tarrant and Dallas Counties, Texas, as being greatly improved, abundant rains having fallen in these sections during the first half of April which apparently has had the effect of killing nearly all the bugs within the area mentioned. Mr. Parks is conducting an active campaign against the chinch bug in northern and central Texas and is assisted by Mr. A.H. Hollinger, formerly connected with the Missouri Entomologist's office.

No reports of extraordinary abundance of chinch bug have been received from the remainder of those portions of the country usually most severely infested, although the situation is such that weather favorable to chinch bugs may produce severe outbreaks in southern Illinois, parts of Missouri and Kansas.

Green bug: During early March reports were received from Messrs. H.B.Parks and F.C.Bishopp indicating the presence of a local outbreak of Toxoptera in the vicinity of Denton, Texas. The outbreak was investigated and the farmers were advised at that time to plow down the infested fields. Mr. T.S.Wilson reports under date of March 23 that a visit to these localitiesshowed that the infested areas had been plowed down as advised and it is believed that this particular outbreak has been quelled, although the area will be kept under surveillance for some to come. Mr. Wilson reports the discovery of one infestation of Toxoptera in Cook County, which had not been plowed down, but it was arranged to have this done at an early date. Mr. Wilson reports that much larger acreages of wheat and oats have been planted in northern Texas than is usual for that section.

Grasshoppers: Mr. L.Seamans, Special Field Agent in Montana, working under the direction of Prof.R.A.Cooley, reports that the indications point to a considerable abundance of grasshoppers in Cascade, Teton, Choteau, and Hill Counties, especially in the lower sections along the river valleys.

The European corn stalk borer: Arrangements have been completed for a cooperative investigation looking toward the effective control of the recently discovered European corn stalk borer, Pyrausta nubilalis Hübn. in eastern Massachusetts. Mr.J.D.Caffrey has been detailed to

take up this work for the Bureau of Entomology, and Mr.S.C.Vinal for the State of Massachusetts. Mr. Caffrey is at present conducting a survey to determine as closely as possible the exact area infested by the insect. Under date of April 20, he reports that the caterpillars are present by thousands in the corn stalks of last year in the counties of Norfolk, Essex,Middlesex, and Suffolk, and arrangements have been made through the States Relations Service to have the county agents in these counties urge the destruction of corn stalks remaining in the field at this time. Under date of March 27, Mr.A.F. Burgess submitted specimens collected by C.E.Hood in corn stalks at Melrose Highlands, Massachusetts. The specimens were determined as Pyrausta sp. and doubtless it is the imported European pest.

The Massachusetts Committee on Food Production is deeply interested in the matter of the control of this pest, and has requested the Department to prosecute vigorously the investigation which was already under way, and it is hoped that by the end of the present season a sufficient knowledge of the biology and ecology of the insect will have been obtained to permit the recommendation of control measures. The fact that the insect has many host plants, including common weeds, will render satisfactory control a matter of thorough cooperation among corn growers, and the entomological fraternity especially will appreciate the difficulties in securing the necessary action.

White grubs: Under date of April 1, Mr.J.J.Davis issued through the Office of Information of the Department a warning note of a probable destructive outbreak of white grubs in many sections north of a line drawn from Philadelphia to Des Moines, Iowa. The last destructive outbreak having occurred in 1915, and the life cycle of the species involved being three years, makes it probable that severe injury may occur during the approaching summer.

During the past two weeks there has developed, throughout southern Arizona, a very serious infestation of aphids. These are to be found in large numbers upon a great many crops and plants, but the ones that interest us are those affecting the three important grain and pasture crops of southern Arizona, namely, barley, wheat and oats.

Dr. A.W.Morrill, State Entomologist, called our attention to these outbreaks and immediately following reports began coming in from all sectionsin the Salt River Valley and elsewhere about the State. In the Salt River Valley, injury seems to be due to two aphids, Toxoptera graminum and Aphis maidis;the latter occurring only on bardey, while the former is injuring all three grains. In a great many cases it has been necessary to recommend immediate pasturing of certain fields in order to save that portion of the crop which has already developed.

This outbreak of aphids seems to be due to exceptionally cold nights which has seriously interfered with the development of parasites. The injury is confined mostly to late planted grain fields or to fields in which soil and cultural conditions are not what they should be for a thrifty growing crop.

The outbreak in the Gila Valley of Arizona seems to be especially severe, and since Mr. Hogg visited this locality and investigated the outbreak and since the report of his trip to this section of the State is typical of conditions existing elsewhere, his report is quoted as follows:

"Upon investigation the damage was found to be the result of

the work of the Spring Grain Aphis (Toxoptera graminum Rond.). The writer visited the country surrounding the towns of San Jose, Solomonsville, Safford, Thatcher, Central, Pima and Eden, noting the extent of the damage, and where possible consulting with the owners of infested ranches.

According to the information obtainable, it was only the grain planted after the first week of December that was severely injured. Some of that planted prior to December first was severely attacked but is now headed out. There may be some of this grain that was retarded in its development sufficiently to prevent the heads from filling. Roughly estimated the grain planted late in comparison to the total area in grain, it will not be much over 20 per cent. In most of these late planted fields, some of the grain was heading out, and if the heads fill the crops will run from one-third to one-half the average yield, and the owners practically expressed themselves as desirous of producing what grain they could, since grain means flour, rather than pasture even though they would not obtain as large a financial return from their fields by the former method. Only in five fields, averaging from six to twenty acres each, out of those visited throughout the valley, was there absolutely no chance of a fractional part of a crop. It was advised that these fields be pastured. Both barley and wheat showed typical Toxoptera injury, the leaves first turning yellow and then a light brown and finally dying.

In all fields examined, a careful search was made for Aphis maidis and Aphis avenae, but in only two instances were the Aphis maidis found. At one field near San Jose, this species was taken on barley, the other specimens were taken on volunteer plants in a wheat field at Pima. No Aphis avenae were found."

W.R. Walton
April 27,1918.

SOUTHERN FIELD CROP INSECT INVESTIGATIONS:

Notes from the Imperial Valley, California.

The cotton leaf-perforator (Bucculatrix thurberiella) is appearing much earlier than ever before observed. Many of the seedling plants only a few days above ground are rather heavily infested with this pest. Not a great deal of concern has been felt in the past regarding this species owing to the fact that it has never appeared in numbers until the cotton plant was well developed and able to keep apace with the development of the pest. A very little activity on the part of the perforator larvae results in the destruction of the cotton seedling, so that the present outbreak of Bucculatrix is quite alarming.

The joint investigation of Hippodamia convergens and allied coccinellids in their relation to aphis control in the Imperial Valley is nearing completion. Several important facts of a rather revolutionary nature have developed in the course of the studies. These will be presented soon in the paper to be published by Mr. W.M.Davidson and the writer.

E.A.McGregor.

Notes from Victoria, Texas.

The following note on the effect of draining and planting in corn a large field which had been in bullrushes may be of interest. Sphenophorus aequalis had bred in great quantities in the roots of the bullrushes. The corn was planted in March and the weevils appeared in great numbers and destroyed the young corn as fast as it came up. They clasp the stalk head down and bore their bills into the stalk near the ground. Several stalks were attacked by two weevils at the same time and pairs were noticed in copulation on March 28. The entire 75 acres planted in corn were infested, and 90 per cent of the stand was destroyed. Multitudes of nymphs of Pyrrhotes haemalostoma in all stages of development were found feeding on seeds of the balboon vine (Cardiospermum halicacabum) which was very abundant. As many as ten to fifteen nymphs were found on a single seed. Adults were also observed with their beaks fastened in seed and were dragging them around with several nymphs also clinging to the seed. Many pairs were in copulation. If the balloon vine seed had not been present this insect would have been sufficiently numerous to destroy all of the corn without the assistance of S. aequalis.

J.D.Mitchell,
April 3, 1918.

Reports of cotton aphis in Lavaca County, Texas, of cutworms in Cameron,Dewitt,Hidalgo,Lavaca,Waller and Wilson counties,Texas, have been received, and of the appearance of the boll weevil in Alachra, Hamilton and Madison counties, Florida, from the Southern Products Company.

INSECTS AFFECTING HEALTH OF MAN AND ANIMALS.

The screw-worm flies appeared in unusual numbers early in April in certain parts of Texas. This abundance may be due in part to the large number of carcasses of animals which died as a result of the extreme drought in southwest Texas, and were not properly cared for. Mr. Parman reports that although the flies were far more numerous in Uvalde County than usual at this time of year only a few cases of screw-worms in living animals have been observed. He believes the number of cases will greatly increase when the flies have had time to feed and mature eggs. At Dallas, screw-worm flies were more numerous the latter part of March than is usually the case the first of May.

During April the writer made a preliminary survey of the horse fly situation in Florida. The annual occurrence of horse flies during March, April and May, especially along the east coast of Florida, is considered to be a serious handicap to the development of the live stock industry in those regions. Apparently the abundance of Tabanids is about normal this year although there is indication that the development of the country, especially through drainage, has tended to reduce the pest during the past few years. Since many large land owners are contemplating

greatly increasing the number of cattle now run in the east coast region methods of reducing horse fly injury should receive serious attention.

F.C. Bishopp.

FOREST INSECT INVESTIGATIONS:

Winter Killing of Insects: The following extracts from letters from Mr. Champlain, Lyme,Conn. are of interest:

I find considerable evidence of winter-killed woodboring larvae at this time. In some of my Magdalis trees I find many dead larvae although it is not too soon to get a percentage. As soon as we have a good thaw I expect to get some data on it. I find it so in standing infested trees and in some I felled and left lying on the ground. I do not notice much difference as yet but warm weather will show it.

The effect of the winter on parasites and predators will be interesting to watch.

I find the winter has killed many larvae, especially those in or beneath bark as Magdalis or Scolytus.

March 15,1918. In regard to winter killed insects I find that about 50 per cent of the Magdalis broods (M. olyra) have been killed in the hickory saplings here. About the same per cent in infested trees felled last fall and left laying on the ground as there were in standing infested trees. The Magdalis seem to go into the bark more than in previous years. About the same per cent of predators (Chariessa pilosa) in these hickories are killed.

Dead wood borers as Leptura etc. apparently are not harmed.

Have found some Prionus larvae in roots that appear to be winter-killed.

Many twig borers, barkboring Cerambycidae and larvae in stems of weeds, vines, etc. are winter-killed.

So far have not found any Agrilus that were killed, all seem to be healthy but deeper into the wood.

I have no information on Scolytus as the infestation in this state and at New Haven where I had previously made observations seems to be on the wane. I do not think it is very bad in Connecticut now. The nearest infestation that is of any extent is that on Long Island.

There is still plenty of time to make observations on winter-killed insects as we have had no spring weather as yet, ground frozen, snow and stormy. So I will continue to make observations as I find evidence.

I think the hard winter has killed or injured some of the trees as well as the insects, especially some fruit trees; will be able to determine this better later.

April 2, 1918. I find continued evidence of winter-killed insects. Many larvae in logs and stumps in swampy places have been killed especially in moist logs. I find dead larvae of Leptura, Tenebrionidae, Elateridae and miscellaneous insects; also Lepidopterous larvae in cocoons beneath logs and stones in swampy places.

April 13,1918. I have found a number of dead pupae and adults of Calosoma scrutator in cells in the ground beneath stones. They were

apparently winter-killed. I dissected the remains for parasites, nematodes, etc. but found nothing of the sort. The pupae were black as are most of the winterkilled larvae. There were some living Calosoma in cells but the greater percentage in the area investigated were dead.

I have also noticed many other adult Carabidae that appear to have been winter-killed in their hibernating cells.

Many spider eggs are apparently winter-killed beneath stones and logs. The ones in swampy or moist places are affected most.

A few scattered larvae of Agrilus bilineatus appear to have been winter-killed in down chestnut tops.

Noted dead larvae of Birch Agrilus in cordwood logs on sides resting on the ground, also dead Cerambycid larvae in same logs on the side next the ground.

W.S.Fisher, Harrisburg, Pa.,writes under date of April 3,1918: The winter conditions did not seem to have very much effect on the insects in this locality, especially the wood-boring species examined in the hickory trees. Scolytus quadrispinosus, Saperda discoidea, Xylotrechus colonus and Graphisurus hebes larvae in the dead hickory trees have all been feeding this spring except a few of the Ceramboycids that formed pupal cells last fall but none have changed to the prepupa or pupa stages. A few dead larvae, which were probably killed by the cold during the winter, were found in the burrows, but these would scarcely average one per cent.

Apparently all the bagworms are killed in the vicinity of Kanawha Station, W.Va. In the third week in March Mr.Kotinsky found Chionaspis euonymi Comst. on Euonymus bushes at St.Elizabeths Hospital, D.C., showing undoubted evidence of winter-killing. Among hundreds of specimens turned up, not one was found alive. This was among green leavesthough the wood of the twigs was also evidently frost-killed.

Likewise Chionaspis americana Johns. on elm twigs received from Providence, Rhode Island, showed distinct evidence of having been winter-killed. The wood was alive but the insects (all females) were dead; a limited amount of the characteristic purplish fluid in their bodies and the few eggs under an occasional scale seemed to indicate that the insects were overtaken by an early frost which had killed them before the work of oviposition was completed.

Mr.Kotinsky has noted that a colony of Toumeyella liriodendri Gmel.(the tulip scale) on a Magnolia tree in Washington, D.C. has been completely exterminated by the cold last winter. The tree was heavily infested the year before as witnessed the great numbers of the insects on the wood, the conspicuous coat of sooty fungus and the complaint of the owner of inferior blooms. This year the blooms are normal, but not a single living scale insect was found on the tree, which is located on the west side of the building thus exposing the insect to the severest winter blasts.

Similarly situated Euonymus bushes in this city were observed on April 24 to be infested with Chionaspis euonymi Comst. (Euonymus scale) in characteristic fashion. Examination of the insects on a cutting under the binocular failed to disclose a single living specimen and winter killing is the only agency that can account for this condition.

A.D.Hopkins,
April 27,1918.

BEE CULTURE:

The interest in increasing honey production as a war measure is being upheld and strengthened throughout the country in a satisfactory manner, largely through the cooperation of Entomologists and State Directors of Extension. Requests for help in the work from this Bureau, especially for the service of extension men, are far greater than can be filled because of a lack of both money and available men.

The extension work of this office is being conducted in 39 states by 13 agents.

A special series of meetings was arranged by E.F.Atwater and G.S.Demuth in the southern states to give assistance in the serious spread of the brood disease, especially of American foulbrood, brought on by the failure of beekeepers properly to diagnose the disease.

The increase in production in Colorado for 1918 will probably be 100 per cent and many beekeepers are changing from comb honey to extracted honey. There has been a marked increase in winter protection.

The winter losses were unusually heavy in the clover region among bees that were not properly protected. The field men are calling attention to the loss and are recommending means of preventing a repetition. The loss is entirely avoidable.

The Bureau of Markets temporarily discontinued the honey market news service in March to be renewed later on a more extensive scale. This service was of inestimable value to beekeepers in 1917 and resulted in the saving of thousands of dollars to producers.

It may be of interest to point out the aid recently rendered the beekeepers of the country by various government agencies other than this Bureau. During the shortage of sugar, the Food Administration granted permits to purchase sugar to all beekeepers whose bees needed feeding and gave publicity to the activity so that full advantage might be taken of the opportunity. It also took steps to expedite shipments of bee supplies, honey and raw materials for supplies, making it possible for beekeepers to get their 1918 supplies promptly. The Fuel Administration permitted the supply factories to run on fuelless Mondays. The Bureau of Markets is also assisting in moving supplies. The Bureau of Crop Estimates will continue the honey crop reports in 1918. It is worthy of note that no request of importance pertaining to beekeeping has been made of any branch of the government which has not been granted. This is a great encouragement to beekeepers as it shows that their work is considered important in the war work.

The exports of 1917 honey to Europe, especially to the United Kingdoms, has exceeded by far any previous year. During the winter it was common for more honey to leave for Europe in ten days than in any year previous to 1914. Imports have been very heavy but honey is now included in the list of articles of which the imports are restricted. There is reason to expect a continuance of the export demand which will result in high prices again in 1918.

The outlook for 1918 is bright. The supply factories have been running overtime all winter and are ready to supply all demands that can be made on them, provided the goods can be transported. There has been an enormous increase in the demand for literature on beekeeping, books and bee-journals as well as bulletins. The demand for bees will far

exceed the supply, due to the desire of beekeepers to increase their production. A fine spirit exists throughout and bee keepers may be counted on to do their best this year. They have welcomed the extension work even more than could be hoped. The winter losses are the only discouraging features in the situation but the unusually good conditions of honey plants will make up for this to a considerable degree.

E.F.Phillips,
April 25,1918.

DECIDUOUS FRUIT INSECT INVESTIGATIONS:

While it is still early in the season to form judgment on insects injurious to deciduous fruits, especially in the more northern states, nevertheless reports furnished by numerous field men connected with this office may be of interest.

Mr.John B. Gill, writing from Monticello,Florida, states that there are no present indications of abnormal abundance of important pecan insects. In unsprayed orchards, the pecan leaf case bearer (Acrobasis urbebella) continues to cause rather serious damage, but in orchards which were well sprayed last summer, this species has been successfully controlled. Judging from present conditions it is likely that the pecan nut case bearer (Acrobasis hebescella) in the Monticello section will be of but little importance. Diptotaxis excavata DeC, has been reported from one pecan orchard and nursery in Jefferson County, Florida, as damaging the buds and foliage of the pecan.

Writing from Agricultural College, Miss., Mr.Oliver I.Snapp states that the San Jose scale is quite destructive in the Delta portion of the State, a large percentage of the trees being incrusted with the insect. Conditions in the Delta in this regard are worse than in other portions of the state. The rusty brown plum aphis, Aphis setariae Thomas, is reported as extremely abundant in all parts of Mississippi. A heavy infestation of canker worms has been noted at Columbus, Miss. The fall webworm has been the cause of request for assistance in the Bay St.Louis region, infesting especially pecans and cultivated persimmons. There is some doubt as to the identity of the insect however.

Mr. J.J.Culver, writing from Fort Valley,Ga., advises that prospects are for a heavy infestation of the plum curculio, though in view of the large peach crop, the attack will be much diluted. He also reports some infestation from the black peach aphis. On the whole however, insect conditions in that section are but little if any different from normal.

In Texas, according to Mr.C.J.Foster, insect conditions are not much different from the average. A distinct improvement is noted in the care given orchards for injurious insects as compared with two or three years ago. Thus, when examining orchards in 1916 it was noted that 80 per cent of these were infested with San Jose scale, and three-fourths of this number were so heavily infested that the life of trees was in danger. Many orchards were dead and dying from the fruit-tree

barkbeetle, or from neglect. This condition however is now notably improved.

In the pecan belt of Texas, as reported by Mr.A.I.Fabis, pecan trees suffered severely from the prolonged drouth of 1917 and the early freeze in the fall of that year. It is feared that owing to the weakened condition of the trees unusual damage will result from certain wood-boring insects. Present indications point to a light infestation by the hickory twig girdler, Oncideres cingulata, and the pecan shuck worm, Laspeyresia caryana.

Mr.R.J.Hiske reports no unusual insect conditions in New Mexico. A freeze on the morning of April 20 did serious damage to unsmudged apple orchards, reducing the commercial crop by perhaps one-third.

In Kansas, as reported by Mr.W.R.Martin, insectconditions with the exception of the codling moth, are about normal at this time. In the Arkansas Valley, where there are at present growing about 1200 acres of bearing apple trees, the loss from the codling moth during the season of 1917 was from 50 to 75 per cent of the crop. Most of this was due to the large brood in August. At the present time some of these orchards show that 75 per cent of the over-wintering larvae have survived while in other orchards, especially in the southern portion of the valley, the mortality of the over-wintering larvae is as high as 80 to 90 per cent.

In Arkansas, Mr.Dwight Isely reports orchard insect conditions as but little if any different from normal. The spring canker worm has been noted in a few orchards, and the peach-tree barkbeetle, Phloeotribus liminaris, has caused some damage to cherry trees.

Mr.B.P.Beach reports from Winchester, Va. that, while it is too early to make any considerable statement regarding orchard insects in that region, it should be noted that the recent heavy snow coming just after the breaking of the buds of the apple seems to have killed all of the stem mothers of the rosy aphis and the grain aphis.

From French Creek, W.Va., Mr.F.E.Brooks reports that aphids of all kinds are unusually scarce and injury from them will apparently be negligible. The grape vine flea beetle, Haltica chalybea, atpresent is feeding on grape buds, but not in sufficient numbers to indicate a serious outbreak. The season in that region is still too early to permit judgment on abundance of other forms.

Mr.R.W.Kelley of Indiana, states that the San Jose scale is found in varying degrees of severity in many old unsprayed apple orchards of the state, and these are also badly infested with the scurfy scale. In the southern part of the state the freeze of April 9-10 apparently destroyed large numbers of the green apple aphis that had hatched out during the warm weather of March. Present prospects are that Indiana will have a bumper crop of apples and it is expected that more spraying will be done this summer than usual.

In northern Ohio, as reported by Messrs. Ingerson and G.A. Runner, the unusual low temperature of the past winter resulted in severe injury to grapes, especially the Catawba, which is the main variety in the Kelly Island and Sandusky region. While the Catawba shows about 50 per cent of the buds killed, only about 10 percent of the buds appear to have been killed in the case of the Concord variety. Eastward of Sandusky, where the Concord and Ives varieties are more extensively

grown it is expected that injury will be notably less. Mr.Ingerson reports that on account of the high cost of lime-sulphur, less San Jose scale spraying has been done than usual. No severe attack of apple aphids has yet been discovered, and no serious injury from these insects is anticipated. The plum curculio is reported as abundant, necessitating careful treatment. The over-wintering brood of the grape berry moth is not as large as during the seasons of 1915-1916-1917, although thorough-going control measures will be necessary to hold it in check.

Mr. F.L.Simanton, of Benton Harbor, Mich., reports that the pear Psylla, which has been unusually abundant in the western part of the state during recent years has almost entirely disappeared, owing apparently to the severe winter. The low temperatures were also unfavorable to the San Jose scale and living insects are found with difficulty. The eggs of the green apple aphis are fairly abundant in young orchards and nurseries, though serious injury is not anticipated. Egg masses of the white-marked tussock moth are more abundant than usual in orchards in the Benton Harbor district.

But little information has come to hand from the Pacific Coast states. Published reports indicate that the pear thrips has been more abundant than usual in the San Francisco Bay region and in the pear growing districts along the Sacramento River.

In Oregon, according to Mr.E.J.Newcomer, the season is perhaps a week later than normal, and it is not yet possible to surmise as to abundance of orchard insects. It is believed that the spring has been favorable for the development of insects, as it has not been cold and wet. The rosy apple aphis is reported in the papers to be more numerous than usual in the Willamette Valley, and in the same territory the pear leaf blister mite is very common.

From Connecticut, Mr. E.H.Siegler, advises that the season is opening somewhat early, due to mild March weather. The extremely cold winter destroyed the peach crop, though prospects for apples are good.

In Rhode Island, according to Mr.F.J.Rimoldi, scale insects have been rather generally killed by the cold winter. Apple aphids are reported as quite prevalent, the majority being hatched now (April 23).

Mr. L.C.Griffith states that in the Kinderhook section of New York the pear thrips was first found attacking pear buds on April 13. The first pear Psyllas were also observed on that date, at which time the first eggs were located. On April 16, apple aphids were noted as active at Roslyn, Long Island.

A.L. Quaintance,
April 30,1918.

TROPICAL AND SUBTROPICAL FRUIT INSECT INVESTIGATIONS:

Mr.Yothers reports that the white fly is more abundant now than it has been for many years. He ascribes this to the excessive defoliation by the freeze of February, 1917, which resulted in the practical absence of fungus last year. The white fly certainly becomes abundant almost a year ahead of the entomogenous fungi. There will be much spraying this spring for white flies, scale, and rust mites. The outlook is about the same as usual for rust mites.

Mr.Moznette reports that the exceptional cold weather of last winter at Miami, Florida, and neighboring sections of the State, with frequent killing frosts, resulted in severe injury to avocados, mangoes, and papayas. The avocados of the South American type were especially subject to frost injury; those of the Mexican type being considerably hardier. The scale insects infesting avocados and mangoes were destroyed with the portion of the trees killed. The temperature conditions, however, were not uniform, hence no complete killing out of infesting insects resulted.

The scale and other insects of chief importance with relation to the plants discussed seem to be for the avocado, Chrysomphalus dictyospermi and the white fly, Trialeurodes floridensis in nurseries and also on mature trees in protected places; for mangoes, Coccus acuminatus (formerly mangiferae), Heliothrips rubrosenthus, and also occasionally Leucaspis indica; and for the guava, Pulvinaria psidii.

The prevalence of dry weather which still continues has favored the multiplication of the red spider and thrips, especially the mango thrips. In some of the avocado and mango plantings the red spider has been so abundant as to cause the leaves to turn brown and drop prematurely. To combat the red spider the trees should be sprayed with lime-sulphur 1-40 in December, January and February, before the new growth appears.

Mr. E.R.Barber has submitted the following report on the effect of winter conditions on scale insects and the Argentine ant in the vicinity of New Orleans, Louisiana.

Icerya purchasi. At New Orleans where the lowest temperature recorded was 16 degrees above zero on January 12, the Icerya hibernated remarkably successfully. Apparently the only mortality to this scale was caused by the winter-killing of a few of the tenderest host plants, such as plumbago and citrus: the scales on these plants naturally dying with the host plants. Wherever the host plants lived, the scales seemed entirely uninjured even in the egg and earliest larval stages. The Argentine ant, through its symbiotic relations with Icerya, presumably carried large numbers of the young larvae of the scale to the roots of plants in their nests below ground. An investigation revealed the presence of this coccid on the roots of many species of host plants. At Brookhaven, Miss., where a temperature of 6 degrees above zero was recorded, no living traces of Icerya could be discovered on plants outdoors. However, as this particular infestation was quite small and had been very energetically worked on by the property owners by continuous spraying and hand-picking, it is very probable that only young, larval stages had been present on the infested plants. These were undoubtedly killed. As the Argentine ant is present in large numbers in Brookhaven, it is quite probable that they have carried numbers of the young Icerya larvae to their underground nests, which will presently issue forth to reinfest the plants. Later observations will be necessary to prove the accuracy of this statement.

Vedalia cardinalis. The Vedalia overwintered quite successfully at New Orleans. Frequent observations were made to ascertain if any injury had been caused to this very beneficial predator, and

in no instance could it be discovered that even the first instar larvae had been killed. The Vedalia did not really hibernate, for each warm day they would become active and continue to devour the cottony-cushion scale.

The present status of Icerya control at New Orleans looks very encouraging. The Vedalia is present in nearly every small reoccurrence of the scale and it seems quite safe to predict, at this time of writing, that it will be well under control by July.

The Argentine Ant.--Undoubtedly the severe winter has materially reduced the numbers of the Argentine ant by at least 50 per cent at New Orleans. They have the faculty, however, of soon building up to their maximum numbers. This has been very evident in several instances. That they can successfully withstand low temperatures was proven by their ability to hibernate at Jackson, Miss., where 4 degrees above zero was recorded and at Starkville, Miss., where 1.5 degrees below zero was experienced. Their overwintering at Starkville constitutes the lowest temperature to which they have been subjected in the United States and from their ability to withstand this severity, it adds considerably to the seriousness of this insect as a pest. In normal years a very large area of this country lies open to the ultimate infestation and depredations of the Argentine ant.

The Magnolia Scale, Neolecanium cornuparvum: This magnolia scale appears to be unusually abundant this spring and its injury to the host plants is very evident. Fortunately it is heavily attacked by a native ladybeetle, perhaps a species of Hyperaspis. The larva is covered with pure white spines and it becomes so plentiful as to make the scale infested limbs quite white. Hundreds of reports have been sent in, referring to this occurrence as a heavy infestation of the cottony-cushion scale.

Mr. Woglum submitted the following report on April conditions of citrus fruit pests in Southern California:

The general condition of most of the common scale pests of citrus throughout the greater part of southern California during the month of April has been noted as much less severe than at a corresponding period for several years. Especially is this true of the black scale (Saissetia oleae), the most widely distributed species which was so abundant in some districts last spring that its presence could be detected at a distance by the smutty appearance of the trees. This present satisfactory condition is the result of the protracted heat spell of last June, when the high temperature of 110° to 120° Fahrenheit were especially destructive to most species of citrus pests. The past dry winter weather without freezing temperature in most of the citrus regions of southern California, appears to have produced slight mortality of citrus pests, and in the case of the red spider and common mealy-bug to have furnished conditions conducive of an unusually heavy spring infestation.

Black scale (Saissetia oleae). In Riverside County and the more interior districts of San Bernardino County, black scale infestations appear to be very light with many orchards entirely free of the pest. As the coast is approached there is a noticeable increase in the number of living insects, although even here the infestations are less than normal. Orchards fumigated last season are almost uniformly

in an excellent condition of black scale control.

The citricola scale (Coccus citricola), like the black, is much less severe than for several seasons past.

The purple scale (Lepidosaphes beckii), which is distributed over the coastal area, appears to have been less affected by the heat of last June than either the black or citricola scales. Infestations of this insect in orchards left unfumigated during the past season are in many cases very severe at the present time. Fumigated orchards are in a satisfactory condition of scale control.

Red scale (Chrysomphalus aurantii). This insect appears to be the one scale pest of general distribution which promises to be abnormally severe this season. It was quite severe in some localities last season, and apparently free from the parasites which commonly act as a partial check to its development. Many orchards containing black and a slight infestation of red scale, which ordinarily would have been treated, were not fumigated last season. Furthermore, according to county horticultural inspectors and fumigators in different parts of Orange County, very poor results were secured in the treatment of these insects with the dosage schedule commonly used, and full success was not met with even when greatly increased dosages were employed. This situation would appear to signify that the red scale in Orange County was resistant to fumigation last season. In this connection it is well to note that resistant red scale has been known for about three years in a part of the nearby Corona district where control has not been satisfactory even when treated with twice the strength employed in other districts with effective results.

Mealy-bugs. The citrophilus mealy bug (Pseudococcus citrophilus) in the Upland and Riverside districts has decreased to a very light infestation. Numerous orchards formerly severely infested with this pest are now clean except for occasional insects found largely on the trunks and branches of scattering trees. No great damage is to be expected from this mealy-bug unless the coming summer is unusually mild.

The common mealy-bug (P. citri). Cold rainy winters reduce this species to very light infestations and usually only a few insects are found on a tree in the spring. The past mild, dry winter, however, has had little apparent effect in decreasing infestations with the result of abnormally large numbers of insects for this time of year. Furthermore, its natural enemies are too scarce to produce an effective check to rapid increase, a situation likely to result in the most severe general mealy-bug infestation in the last three years.

Red spiders (Tetranychus mytilaspidis). This pest is very abundant on citrus trees in the costal district, although attracting little attention in the interior valleys.

C.L. Marlatt,
April 30,1918.

REPORT OF FEDERAL INSECTICIDE BOARD.

INSECTICIDES.

From the writer's information it would appear that the general situation, in regard to insecticides, over the country is favorable as regards the amount of materials on hand, or apparently available. A considerable increase in cost of certain classes of insecticides however is to be noted, especially arsenical insecticides, lime-sulphur preparations and fish-oil soaps.

In connection with the reports on insect conditions given under Deciduous Fruit Insects, the various gentlemen mentioned furnished more or less of information on cost and supply of insecticides, referring particularly however in most cases to their immediate neighborhood.

Mississippi: Powdered arsenate of lead is quoted in quantity at 36 cents per pound F.O.B. and 60 cents per pound in small (mostly pound) quantities. Paste arsenate of lead is quoted at 50 cents per pound in one pound containers. Lime-sulphur concentrate is quoted F.O.B. at 32 cents per gallon in 50 gallon barrels. Flowers of sulphur in small quantity is quoted at 10 cents per pound, or 5 cents per pound in large lots.

Georgia: At Fort Valley, a large consuming center, powdered arsenate of lead is quoted at 50 cents in one pound packages and in 200 pound lots at 35 cents per pound. Lime-sulphur concentrate in barrel lots is quoted at 17 cents per gallon, while gallon cans cost $2, and 5 gallon cans $3 each.

Texas; Powdered arsenate of lead in small lots is quoted at from 75 to 90 cents per pound. Flowers of sulphur 10 cents per pound retail, and 5-8 cents per pound for larger lots. Lime-sulphur concentrate sells mostly at $11 per 50 gallon barrels, F.O.B.

New Mexico: Powdered arsenate of lead in 100 pound lots is quoted at 32 cents per pound.

Kansas: Powdered arsenate of lead sells from 40-60 cents per pound according to quantity. Paris green in small lots costs 75 cents per pound

Virginia: Powdered arsenate of lead in 100 pound lots is quoted at 36 cents per pound, and in 5 pound lots at from 50 to 80 cents per pound.

West Virginia: Powdered arsenate of lead in pound lots is quoted at 60 cents, and in 10 pound lots at 46 cents per pound. The paste form of this poison sells for 36 cents per pound in one pound lots, and in 25 pound lots at 2a cents per pound. Lime-sulphur concentrate is quoted at $11 per 50 gallon barrel

Indiana: Powdered arsenate of lead is quoted at 36 cents in 100 pound lots, and single pound cans at 50 cents. The paste form in 600 pound lots costs 17 cents, and in one pound containers 50 cents, per pound. Lime-sulphur concentrate in barrel lots is quoted at $11 per barrel, while one gallon containers cost 50 cents each.

Ohio: In the Sandusky region powdered arsenate of lead in 500 pound lots is quoted at 35 cents per pound and in 25 pound lots, at

40 cents per pound. In the Cleveland district, in 1 to 10 pound lots, it is sold at 45 cents per pound and in 100 pound lots 38 cents per pound. Lime-sulphur concentrate is quoted in 50 gallon barrels at $8.50 per barrel and in less lots at 25 cents per gallon. In the Cleveland district lime-sulphur concentrate in 1-4 gallon quantity costs 35 cents per gallon, whereas in barrel lots the price is $9.25 to $10 per barrel. Paris green is quoted at from 75 to 80 cents per pound in small lots.

Michigan: Powdered arsenate of lead in 200 pound lots is quoted at from 30 to 35 cents per pound, and in 25 pound lots at from 33 to 38 cents per pound.

Oregon: Powdered arsenate of lead is quoted in 200 pound lots at 38-39 cents per pound, and at 60 cents in one pound containers. The paste form in 5 pound lots is quoted at 30 cents per pound, whereas in 100 pound lots it is sold at 15 to 16 cents per pound. Lime-sulphur concentrate is sold at $11 per 50 gallon barrel, and in 5 gallon quantities at 45 cents per gallon. Paris green is quoted at 75 cents per pound in small quantities.

Connecticut: Powdered arsenate of lead in 100 pound lots is quoted at 45 cents per pound, and in one pound lots at 50 cents. Lime-sulphur concentrate by the barrel costs $10, and Paris green in one pound lots costs 65 cents per pound.

Rhode Island: Powdered arsenate of lead varies from 33½ to 55 cents per pound in one pound lots and from 34 to 37 cents per pound in 100 pound lots. The paste form in 100 pound lots is quoted at from 15 to 17 cents per pound and in one pound containers from 18 to 35 cents per pound. Paris green in 100 pound quantities sells for 44 cents per pound and in one pound lots at 65 cents.

In all of these states, with the possible exception of Texas, our reports indicate that the supply is adequate at least for immediate needs, and that in many cases orders have been placed for additional materials to meet requirements as the season progresses.

A.L. Quaintance,
April 30,1918.

REPORT OF THE FEDERAL HORTICULTURAL BOARD.

Pink Bollworm Field Work in Texas: The destruction and clean-up of cotton in and surrounding the districts in Texas invaded by the pink bollworm is now practically completed for the crop of 1917. The following summary of this work is condensed from a report prepared by Mr.F.S.Puckett for Dr.Hunter:

A total of 8794 acres of cotton land has been cleaned of standing and scattered cotton at an average cost of $9.94 per acre.

The cotton fields cleaned represent 657 owners or tenants or an average of 13.38 acres to each owner or tenant. Most of the fields consisted of from one to one-half dozen acres and only in a few instances did the fields approach or exceed one hundred acres.

In addition to the clean-up of these cotton fields within and surrounding the known infested areas all the gins in this section,

some twenty in number, have also been subjected to a thorough cleaning, with destruction of remaining and scattered seeds.

An effort has also been made which has been substantially successful to collect and mill under supervision all cotton seed grown in this section, and the lint cotton has been shipped to foreign countries via Galveston. These several steps have eliminated so far as is now possible the chance of over-wintering and reinfestation of the new crop by the pink bollworm hibernating in the cotton fields or in cotton seed or in lint cotton of the crop of 1917.

Under the recently enacted Texas law proclamations have been issued by the Governor of Texas quarantining the known infested districts in Texas, namely, the Hearne district and the large district surrounding Trinity Bay and including Beaumont. Supplementing this action these same districts have been established by proclamation of the Governor as cotton free areas. Within these areas the growing of cotton is designated a public menace and is prohibited "for a term of three years or so long as such condition of menace to the cotton industry shall be deemed to exist". A border cotton-free zone has also been established by proclamation of the Governor to include the counties of Kinney, Maverick and Valverde, as a result of the determination of infestation of cotton lands in Mexico within twenty-five miles of the Texas-Mexican border, opposite Eagle Pass and Del Rio. In these counties the growth of cotton is similarly prohibited for a period of three years.

zz Miscellaneous Notes: The Agricultural Appropriation bill now in conference carries an item of $500,000 for the pink bollworm work in Texas and Mexico, including the border inspection service.

Foreign and domestic quarantines were promulgated March 15, effective April 1, 1918, prohibiting the further entry into the United States from all foreign countries of banana plants, and extending the same prohibitions to Hawaii and Porto Rico. These quarantines have reference particularly to the banana root-borer (Cosmopolites sordidus Germar) which has already been found in two limited localities in Florida. Work now under way under the direction of Mr.Newell, will probably lead to its extermination at these points.

A possible new subject of quarantine is the corn stalk borer recently introduced into New England from Europe, apparently in connection with importations of hemp brought to the mouth of the Mystic River, inasmuch as the infestation seems to be confined to towns near the mouth of this river. This insect, from the extent of territory already covered and its wide range of food plants, may possibly have gotten beyond quarantine action. It is being investigated by Massachusetts entomologists in cooperation with the Bureau of Entomology of this Department.

A notice of public hearing on proposed restrictions or prohibitions with respect to the importation of plants and seeds from foreign countries was issued March 28,1918. This hearing is called for May 28 and has in view particularly the question of prohibiting or restricting the further entry of plants imported with earth about the roots and plants from little-known and little-explored countries of the world, and as to which there is almost a complete derth of information concerning insect pests and plant diseases.

C.L.Marlatt,Chairman,

REPORTS FROM STATE OFFICERS AND OTHER CORRESPONDENTS ARRANGED BY STATES.

ARIZONA.

The principal entomological activities in Arizona during winter and early spring seasons consist in inspection and quarantine work. Several shipments of cotton seed, seed cotton and cotton seed sacks ranging in amounts from a few handfuls to three quarters of a ton of seed each have been received from boll weevil and pink bollworm infested sections. A live boll weevil was found in one lot of cotton seed and abundant evidence of boll weevils in other lots. Insects destructive so far this season include the peach twig borer (Anarsia lineatella), the apricot thrips (Frankliniella n.sp.Morgan), cutworms in gardens, corn leaf aphis in spring barley fields, a Nitidulid beetle, Conotelus mexicanus, injurious to blossoms of blackberries and deciduous fruits, and a Tenebrionid beetle apparently of the genus Blapstinus, noticeably but not seriously injurious to young cotton plants. Conditions appear favorable for control of aphis on cotton and melons by hymenopterous parasites and predaceous enemies.

A.W. Morrill,
April 13,1918.

CALIFORNIA.

Mr.G.H.Hecke, State Commissioner of Horticulture, has agreed to collect statistics for 1917 from the County Horticultural Commissioners on the consumption and cost of economic poisons. It appears that enough information was received from the figures for 1916 to warrant the undertaking again.

In the absence of Prof.W.B.Herms, who has been commissioned as Captain in the Sanitary Service, the mosquito survey of the state will be continued this year by Prof.S.B.Freeborn in cooperation with the State Board of Health. It is anticipated that the survey will be completed this year.

Pear thrips have caused more injury to pears and prunes in the Santa Clara Valley and along the Sacramento River than has been noted since 1912. Prof.E.R.DeOng has been investigating the matter and reports as follows: "The injury has been largely confined to local areas. The greatest loss has been to pears, occasional orchards have been almost denuded of bloom. Prune injury was largely restricted to sandy, unirrigated areas where the fruit buds had been greatly weakened by ten months drought. Normally the prune tree sets a heavier bloom than is necessary to produce a crop but in orchards injured by drought a moderate thrip attack in some cases has been sufficient to destroy the crop. This seems to have been the case in most of the attacked areas this year. Pear injury was more general, since a light bloom was common in many districts and any attack by thrips

reduced the crop. This year's experience emphasizes the need of more general irrigation in the fall when the buds are forming, as well as the addition of sufficient fertilization to keep the orchard in thrifty condition. This is especially true in light soils. When these measures fail, then recourse may be had to sprays such as the tobacco-distilate and lime sprays, although the short time in which these can be successfully applied makes them somewhat unsatisfactory. This year very little spraying was done, either for the larvae or adults."

The Division of Entomology is cooperating with the Division of Plant Pathology in an investigation of the beet leaf hopper. Prof.H.H.P.Severin has been devoting his whole time to this work.

Geo.P.Gray,
April 20,1918.

The outbreak of the cottony cushion scale on citrus in Tulare County is very striking and most interesting. As near as we can determine this is due to spraying the orchards with a proprietary combined insecticide and fungicide which contained arsenicals and which destroyed the Vedalia. The outbreak was evidently as bad as those when the cottony cushion scale was in its palmiest days. A liberal distribution of Novius cardinalis has apparently checked it.

We are watching the red spider situation very carefully in order to avoid an outbreak such as we had last year, due to difficulty of obtaining spray materials and labor.

Harry P. Smith,
April 15, 1918.

CONNECTICUT.

Some time ago I received a letter from Prof.A.L.Lovett of Oregon in which he expresses the belief that a more thoroughly organized effort among the entomologists for making tests of insecticides is desirable. He thinks that through cooperation some of the newer insecticides might be tested out and in one season in different localities so that we can get a fairly good idea of what can be accomplished by their use, and consequently, what to advise. As you know the price of lead arsenate is high and some of the substitutes are not being manufactured in large quantities. Many growers are asking questions which entomologists cannot answer off-hand. One matter has been pointed out which concerns the use of wheat bran in the poisoned bran mash, formerly recommended to kill cutworms and grasshoppers. This point is whether the Food Administration will allow its use for such purposes. Professor Lovett also believes that honey production can be greatly increased by a little attention, etc. He also thinks that the Federal field specialists are doing a great work but that the entomologists should be in closer touch with them

and know better just what they are doing and where they are working. Professor Lovett cites the organization of the War Emergency Board of Plant Pathologists and seems to think that entomologists should organize further along these lines. I call it to your attention for what it may be worth and have no plan to suggest. Here we are short-handed and it is hard to get help. Our funds are also somewhat limited and this probably is the case at many of the state institutions.

W.E.Britton,
April 23,1918.

FLORIDA.

Work against the sweet potato root weevil, Cylas formicarius, has been taken up in earnest in Florida. For the past year the State Plant Board has been enforcing quarantine rules preventing the distribution of sweet potato plants from sections of Florida where the weevil is known to occur. The University of Florida Extention Division has been active in educating the farmers in both the infested and non-infested sections regarding the pest, the farmers in the infested areas being instructed in the best methods for subduing the insect and those in the weevil-free areas being advised to secure only certified plants for planting and to avoid the purchase of sweet potato tubers from infested sections.

Recently the Bureau of Entomology has entered the work in Florida in cooperation with both of the state agencies named above. Special field agent, O.K.Courtney is in charge of the Bureau work which will consist of both research and practical control. An attempt will be made, in cooperation with the State Plant Board, to eradicate the weevil in an infested area covering several townships, this area being located for the most part in Baker County, Florida, and extending into the southern portion of Charlton County, Georgia. Associated with Mr. Courtney are Mr.H.N.Gellert, Mr.B.L. Boyden and Mr. Wm.H.Merrill of the Bureau. Provision will shortly be made for a number of additional inspectors. A field laboratory has been established at Macclenny in Baker County, and is being rapidly equipped. In addition to carrying on research work and prosecuting the eradication campaign vigorously in the Baker-Charlton infested area, survey work will be pushed throughout the State for the purpose of locating any centers of infestation not yet found.

The undersigned, Plant Commissioner of Florida, has been designated as state leader of the weevil project, and Mr.K.E. Bragdon, of the State Plant Board, is in immediate charge of the field inspection work for the Board in connection with these projects.

Wilmon Newell,
April 10,1918.

White Fly: The appearance of whitefly in large numbers was much earlier this year than other years, probably at least a month earlier. This is due to the fact that after the rather prolonged cold weather up to and into January, the weather in Florida has been very mild. This accounts for the early appearance of the whitefly. The principal condition that resulted in an unusually large brood of whiteflies was the fact that the citrus trees retained their foliage, notwithstanding the cold period prior to and including part of January. This cold period was continued and resulted in the trees becoming dormant so that any unusual drop of temperature did not defoliate them like it did in 1916-17.

For the control of whitefly in the spring, growers have been advised to spray with an oil emulsion, but quite a large number were anxious to introduce the Red Aschersonia or Red Whitefly Fungus much earlier than other years. Growers, however, were advised to postpone using the fungus until the period of summer rains, unless unusually wet and warm weather conditions were prevailing in their particular localities.

Growers who did not spray or who were not able to use the fungus to advantage may expect to experience unusually large summer and fall broods of the whitefly unless they are very prompt in doing some summer spraying with oil emulsions or will be prompt to use the Red Aschersonia when the proper time for its application arrives.

Growing Whitefly Aschersonias: As during the two preceding years, the entomological department of the Plant Board is preparing approximately 2,000 cultures of the Red Aschersonia and will in addition this year also prepare about 500 cultures of the Yellow Aschersonia, for it is the specific enemy of the cloudy-winged whitefly. These cultures are in the process of preparation and the work will probably be completed by the end of this month. It has been found necessary to grow these cultures during spring before the warm weather sets in, as it was found two years ago that they will not ripen properly during conditions prevailing in summer weather.

Cottony Cushion Scale and Vedalia: The Cottony Cushion Scale also became in evidence early this season in many localities in the state. As heretofore, the entomological department of the Plant Board has been furnishing the Vedalia or Australian Lady Beetle to growers who need them, and hundreds of these useful beetles have been distributed.

Due to the unusually early spring, many other insects of course began to increase earlier than during other years.

E.W.Berger,
April 22, 1918.

GEORGIA.

So far this year the most important insects that have been reported in Georgia are the following: Mayeticla destructor (Hessian fly) as doing considerable damage in Henry County.

Up to March 30, from our hibernation cages at Thomasville, only

1.4 per cent of the weevils have emerged. It is too early yet to tell just how severely the cold weather killed the boll weevil last winter. We have had reports from a few places that live boll weevils have been found in the old cotton bolls in the fields. As the cold weather this winter occurred when the weevils were dormant and it was a continued cold spell, I do not believe the weevils were killed to the extent that they were last winter.

A.C.Lewis,
April 9,1918.

ILLINOIS.

The winter has been very hard on codling moth larvae in Illinois, one of my field observers reporting only 10 per cent alive in places where he has found an average of 90 per cent living in the past three springs. Of those hibernating on the trunks of trees, only 6 per cent were alive, which is about a tenth of the ratio of living larvae passing the last three winters in the same situation. Two thousand larvae kept during the winter in out-of-door observation cages had all perished this spring, although during the past three winters 75 per cent of those kept under the same conditions had survived.

Adult Hessian flies were first seen on March 31, in Washington County in southern Illinois, and April 1-4 from 10 to 17 per cent of the wheat plants bore eggs of the Hessian fly where recent rains had fallen, although none could be found where there had been no rain.

S.A.Forbes,
April 11, 1918.

KANSAS.

The canker worm is unusually abundant in the eastern part of the state, and a number of cities have taken the matter in hand, in some cases banding and caring for the trees from a general tax, and in others by private property tax. This is the third year of the present undue prevalence of the canker worm, and it is interesting to note that in parts of the cities where they were unusually bad last year, they are few in numbers this year and in parts where they were absent last year, they are unusually prevalent this year.

We have had a number of inquiries regarding insects in stored grains, but these have been referred to Professor Dean who, as you know, has given long attention to this class of work.

S.J.Hunter,
April 11, 1918.

Careful surveys of last fall and this spring in Kansas lead us to believe that there will be less Hessian fly injury to this year's crop of wheat than for many years. In fact, with the exception of a few local places, the loss probably will be almost negligible.

A scouting trip has been made over Southern Kansas and northern Oklahoma to ascertain the green bug situation. There are no indications for an outbreak or even local infestation.

The emergence of chinch bugs from winter quarters was earlier this spring than usual. The chinch bugs are increasing in numbers and with favorable conditions, some damage may be expected in certain sections of the state.

The worst insect injury to wheat has been caused by the false wireworm(Eleodes opaca). Last fall this insect destroyed a large acreage of wheat soon after planting and has done much injury this spring. The area of greatest infestation includes the western one-third of the state. In many locations, very probably much of the injury contributed to winter killing was caused by this insect. Several reports of injury to germinating oats have also been received, especially where the oats was planted on ground sown to wheat last fall.

In the western half of the state, indications are favorable for an outbreak of grasshoppers. The farmers will be kept in close touch with the situation and in all districts where the grasshoppers appear in threatening numbers, the poisoned bran mash will be used. A law passed two years ago by the Kansas legislature makes it possible for the farmers to receive county funds for the control of grasshoppers. However, before the county officials appropriate any funds for this purpose, the farmers must organize for cooperative control work and use the methods advocated by the Agricultural College and its extension men.

In South Central and South Western Kansas, there is usually considerable injury to wheat and alfalfa by the army cutworms. This spring the injury was negligible.

Not only a large amount of orchard demonstration work is being done by the extension entomologists but there are also thousands of acres of orchards being sprayed under the direction of the extension entomologists. The fruit insect men are now devoting their entire time to this work. Everywhere the fruit men are cooperating in a splendid manner.

Geo. A.Dean,
April 23, 1918.

KENTUCKY.

The leaves of trees and the flowers of red bud are just appearing, and while farm work and gardening is beginning, the growing season is not far enough advanced to bring out any great number of pests.

The tarnished plant bug (Lygus pratensis) is an exception. It has already done some mischief to the swollen buds and young leaves of apple, its punctures causing them to blacken and abort. The slyness and activity of the pest often cause it to be overlooked as the source of this mischief and other insects, such as plant lice, are given the

blame. Coal-oil emulsion suggests itself as a possible remedy, but the quickness with which the insects drop to the ground renders them hard to deal with by a spray of any sort. Dilute lime-sulphur as a deterrent, together with the cleaning away and burning of rubbish on the ground, that may provide lurking places, is suggested to reduce its injuries.

The presence of several myriapods (Julus hortensis and J. virgatus among them) has been noted in hot beds where they are believed to be doing some harm to the underground parts of young plants and to germinating seeds. Steaming the soil used in such beds before planting is a very satisfactory treatment, but unfortunately too few of our growers practice it. This treatment is to be highly commended as a safeguard against soil-infesting pests of many sorts. It leaves the soil in excellent condition for the growth of plants, whereas dry heat burns out nitrogen and humus, and renders the soil too compact. We have found it a simple matter to apply steam by the use of perforated iron pipes connected with a boiler of some sort.

Kentucky farmers and gardners have of late been planting an exceptional acreage of beans and peas, and already the influence of this has been observed in an increased destructiveness of weevils. Two cowpea weevils, the bean weevil and the pea weevil, are common in the State, but it is believed have been somewhat reduced in numbers since last fall by the excessively cold weather of December and January. We find that a zero temperature destroys the pests if they are exposed suddenly. No doubt many have escaped the cold weather as a result of seeds being left in warm storage places, and it is highly important that everybody be warned of the danger of planting these infested seeds unless they are fumigated with bisulfid of carbon. This Department of the Kentucky Experiment Station has in press a bulletin on the weevils, giving the results of observations and experiments made during a good many years past, together with suggestions as to treatment.

H. Garman,
April 9,

LOUISIANA.

Under the extreme low ranges of temperature reached in this section since the beginning of the year, the question has naturally arisen; has there been any material check on injurious insects or insects in general? A correlation of observations seems to prove that in only a minor degree has this been realized.

January showed the low mean of 48.15 degrees, the minimum being 17 degrees on the 12th; the maximum, 77 degrees, on the 28th. The sharp upward turn about the 26th was followed by swarms of the Citrus white fly (Dialeurodes citri) issuing from the Amur River privet hedges. February showed a range between 32 degrees and 84 degrees; March from 43 to 84 degrees, and since the beginning of the present month it may be said that there has been an unusually low range as compared with previous years. Coupling these facts together, any summing up may be: that development has been checked during the cold spells but the actual killing off of the pests to any material degree has not resulted.

The writer is inclined to make at least one exception, Aspidiotus ficus (The Florida Red Orange Scale). In this case there has been a diminution at least of infestations on Oleanders and the palms, Phoenix canariensses and P. dactylifera. These were practically defoliated and in part killed by the freeze of January 12th and an examination before the dropping off of the leaves showed a large percentage of the scales killed. The form, however, is again rising. The practical defoliation of all Phoenix palms is interesting from another angle. The fungus Graphiola phoenicis has shown asmarked increase in this district during the past few years. In the aggregate only about 5 per cent of the palms and other ornamental trees were killed; on the other hand, oranges which were thought to be little damaged have proved a serious loss, especially among young stock, while practically all garden annuals were wiped out.

The season has seen a rather marked increase in the numbers of the sow bug or "pill bug" (Armadillidium vulgare). The damage has been much exaggerated, but the writer has caught them in numbers eating the young shoots of beans after dusk and in one instance on the tender stalks of beets. Slugs (Limax spp.) and a species of snail (Helix sp.) seem to be the main culprits.

The blister beetle (Epicauta vittata) was noticed on potatoes on April 20, a rather early record for this insect. A species of flea beetle (Disconycha sp.) has in some cases killed off individual crops of beets, but the infestation has been by no means general, and those planted early seem to have practically escaped. The 12-spotted leaf beetle (Diabrotica 12-punctata) and the striped leaf beetle (D. vittata) are now appearing in numbers on squash, potatoes and roses. The latter form is quite numerous and considerable damage can be traced to it, especially on squashes. There have been reports of the Colorado potato beetle (Leptinotarsa 10-lineata) but the insect has not yet come under the writer's observation.

Other than Florida Red Orange Scale, there has been no apparent or rather marked diminution in Coccids. There has been some check in development, and any real check in infestation may be rather traced to increased efforts on the part of householders in the way of spraying. The scale (Neolecanium cerniparvum) which has shown a gradual increase on the Magnolias is now unusually abundant. It is accompanied by immense swarms of Coccinellids (Hyperaspis signata Oliv.)(and the variety binotata Say). The larvae of the same ladybirds have been found feeding on the Wax Scale (Ceroplastes cirripediformis), the White Peach Scale (Aulacaspis pentagona), Lecanium sp. and the mealy bug (Pseudococcus citri). The marked resemblance of the larvae to the latter mealy bug has caused some alarm and inquiry, and has been mistaken by many for the Cottony Cushion Scale.

Some years ago the oaks in Audubon Park were badly infested by the Barnacle or Wax Scale. It was held by the head gardener that a native ladybird was instrumental in cleaning up the pest. The writer has no information as to whether the beneficial insect in that case was H. signata; the inference however is at least of some interest.

Another ladybird (Cycloneda munda Say) is at present more numerous than for many years. It has been found feeding mostly on

aphids affecting potatoes. The well-known Hippodamia convergens is also conspicuous but not to the same extent as the last named.

There have been but few complaints of aphid damage on either peas, beans or roses. The latter have been troubled more than usual with thrips, but the healthy and vigorous state of the plants have served to offset any material damage.

The squash bug (Anasa tristis) is now beginning to make itself felt on curcubits in general.

In conclusion the writer had noticed during the past three months that any sharp upward turn in temperature has been followed immediately by an increase in the visible insect life and about 75 degrees seems to fix the point.

Ed.Foster,
April 23,1918.

MASSACHUSETTS.

Most of the pests to which our attention has been called have been those common pests of stored-food products, bean weevils, different grain weevils and stored-food infesting species such as the flour moth, etc.

We have also had numerous inquiries relative to the quotations on prices and other matters relative to the securing of insecticides for the coming season. This seems to be causing considerable interest in the mind of our correspondents throughout the state

We have also had our attention called to the Chrysanthemum Gall Midge, a pest which has apparently only recently been gaining a foothold in greenhouses in this region but which is potentially a serious menace to chrysanthemums. We have taken up preliminary studies on this pest with a view to getting more light on the life history and any methods of control which are feasible.

I may say that some questions have been sent in relative to insects which may prove injurious during the coming season. I refer chiefly to the common garden insects. It seems that more interest than ever is being shown in the preparation for insect control, especially in the case of small gardens. This, I presume, is but natural after the experience of last year when many throughout the state took up the care of small gardens for the first time and, therefore, made their first acquaintance with many of the common garden pests.

The European corn borer, which was found to be thoroughly established in the region immediately around Boston, is causing considerable interest in that locality, and the campaign for the destruction of over-wintering larvae in corn stalks and stubble left in gardens has been instituted.

A.I.Bourne,
April 22, 1918.

NEW MEXICO.

During the winter the biologists spent about four weeks in various counties of the state where need was greatest giving lectures and demonstrations at Farmers' meetings, trying to impress more forcibly upon the farmers the need for general recognition of insects and plant diseases in planning farming operations. Agriculture in our state is necessarily more extensive on the whole than intensive, and control operations that involve much expenditure of money are regarded with suspicion. By too many, insects and plant diseases are looked upon either as unavoidable or as something to be conjured against.

San Juan County Agriculturist reports that indications point to a large number of grasshoppers in that section this summer. Slowly farmers there are coming to employ cultural methods of control. Also, this Agriculturist was making an attempt to include the orchardists to use the oil sprays for the fruit tree leaf roller.

In the orchard district of Otero County, the red spider was very severe last season and eggs extremely abundant this winter. Practically all of the growers there this winter applied the dormant spray of lime-sulphur. Some eggs were reported hatching on April 5. Probably such are sporadic.

The dry winter has been detrimental, evidently to the San Jose Scale, a large percentage of the wintering scales failing to survive. More orchardists throughout the state this winter sprayed for scale insects.

In the Mesilla Valley the 12-spotted cucumber beetles was severely injurious locally to early set cabbage as early as the first of March. The succulence of the cabbage evidently attracted them for early feeding.

The cabbage aphis in the same section threatened much more severe and widespread loss to growers before remedial measures were resorted to and the damage checked. The dry winter and cool spring had been particularly favorable for the aphis and their work on the young plants was fatal in some places. A few parasitized individuals were noted in early April. General unpreparedness among the growers for spraying was noted. In one field of six or eight acres some Japanese growers were trying to make headway with a one-quart atomizer, using a mixture of ashes, water, and manure as an insecticide.

As a result of work in some of the bean growing sections last year, more of the growers seem ready to employ control measures against the bean beetle.

D.E.Merrill,
April 16,1918.

MICHIGAN.

On the 25th of June 1917, a larva closely resembling Papaipema appeared at Mason, Michigan, in large numbers. These larvae worked their way down through the heart of the corn which was then less than a foot high, destroying practically the entire field. It happens that a Crambid was also present in the same field, but the larger striped larva was the one that was killing off the corn. Specimens were brought to the laboratory and bred out, and the adults sent to Dr. Wm. Barnes of

Decatur, Illinois. He identified them for us as Oligia fractilinea. Practically the entire field was destroyed and we have been receiving specimens of what appeared to be the same thing from different localities, notably from around Detroit, where the insect is working in sweet corn in gardens.

Papaipema nitela has also been pestering us a good deal for the past few years, boring in potatoes, tomatoes, and various other crops, and last June we received a larva of a Papaipema in corn, the bred adult of which Doctor Barnes has identified as Papaipema nebris.

In regard to the bean maggot, I want to say that no vestige of doubt remains in my mind that shallow, sowed seed of bean escapes with markedly less injury than that which is drilled in at greater depth. The reason seems to be that the caulicle or little bud is a favorite place attacked by the maggots, and that the bean plant which loses its caulcicle before it appears above ground is to be considered legally dead, although the poor thing may struggle along a little while before drying up. The sooner the plant appears on the surface after the cotyledons separate in sprouting, the shorter the time during which it is exposed to the attacks of maggots. It seems also that alfalfa sod is favorable to the maggots, unless plowed up the year previous to planting, the fleshy roots of alfalfa serving to harbor maggots for a longer time than the more slender roots of June clover and other clovers.

R.H.Pettit,
April 19,1918.

MISSOURI.

I am enclosing a few notes dealing with entomological work especially with the field work, since the beginning of the year. The field men are all enthusiastic regarding the attitude of farmers toward insect control and the increase of food supplies. Generally speaking, since I came back here in 1910, insect conditions have never looked better than at the present time. Aside from possible outbreaks of grasshoppers and the somewhat threatening condition of the chinch bugs, we will probably have only the ordinary run of insects to deal with this year.

The work of Federal Extension Entomologists cooperating with the Missouri College of Agriculture under the direction of T.J.Talbert has progressed with great success since the beginning of the year. The men are in the field practically all the time and report unusual interest on the part of farmers in insect control and its influence on the increasing of crops and the conversation of food.

Cereal and Forage Crop Insects: During the past year these insects have been far less injurious than during the five previous years. Observations on the Hessian fly during the past summer, fall and winter and early this spring shows it will require but little attention this year. The grasshoppers are more threatening. The winter has been an unusually dry one and while it has been colder than usual in most places snow covered the ground during the extremely cold weather. In places we will undoubtedly have grasshopper troubles. However

the chinch bug is attracting more of the farmers' attention than any other pest. Extension Entomologist Fort reports the finding of chinch bugs throughout most of the State, they being especially abundant in the western counties.

Insect Pests of Deciduous Fruits: This year a special effort is being made in this state to get farmers to renovate and spray their home orchard. Judging from field observations and correspondence from farmers, they are enthusiastic about this means of increasing food production.

BEEKEEPING: The extension work in beekeeping has been extremely encouraging. During February a number of successful meetings were held and Missouri beekeepers are most eager to help increase the honey crop. The most valuable work will be done during May and later in the summer when apiary methods can be demonstrated.

Insect Pests of Live Stock: The importance of lice stock and poultry pests in reducing meat and poultry production and the production of dairy products is underestimated. Special Field Agent Babcock has been able to give only a couple of weeks of his time to work in Missouri but he has held some very excellent meetings and has found live stock and poultry men ready and glad to follow instructions.

Malarial Mosquito Survey: The Department of Entomology has under way a mosquito survey of the state. Early in February a series of field meetings were held for outlining plans for future work and for getting in touch with all organizations which will be able to help with this mosquito work.

L. Haseman,
April 15,1918.

NEW YORK.

The season appears to be a little backward though a period of warm weather several weeks ago gave hopes of an early spring. Fruit buds, especially pear, are just beginning to start in the vicinity of Albany and it is still a little early for insect outbreaks.

San Jose scale is not a serious pest in many parts of the state as evidenced by the fact that 41 reports from 29 counties state that it is not sufficiently injurious to warrant general spraying; 13 reports from 10 counties class the insect as not very abundant, while 26 reports from 14 counties rate it as abundant. These figures while only of approximate value indicate in a general way the standing of the pest. There is at least one excellent commercial orchard in the Hudson Valley which has not been sprayed for two seasons and there is so little scale at the present time that the owner will not make an application this spring. Generally speaking scale is more serious in the western fruit growing section of the state than it is in the Hudson Valley. It is very probable that parasites and the use of lime sulphur as a fungicide have combined in keeping the insect from multiplying in many of our best orchards.

Pear Psylla and pear thrips, are not abundant. Generally speaking the Psylla is widely distributed and frequently injurious in the im-

portant pear growing sections while the thrips is much more limited in its distribution and very local in abundance.

The place occupied by bud moths, leaf rollers or case bearers in the estimation of growers is indicated by 43 reports from 26 counties to the effect that these pests have not been serious locally in the last few years while 35 reports from 24 counties testify to opposite conditions prevailing.

White grubs are generally distributed and in view of the fact that maximum injury comes this year, 19 reports from 18 counties to the effect that large damage is anticipated is at least significant, though 34 reports from 21 counties indicate no such apprehensions and 28 reports from 22 counties are non-committal.

Reports from all sections of the state indicate as a rule moderate to fairly satisfactory supplies of insecticides and fungicides at high prices, though in a few sections there is a shortage of one or more material and in some places it will be necessary to use substitutes in place of the insecticides generally employed. It is believed that a careful use of materials available will result in adequate protection from insects and plant diseases unless there be some unusual developments.

The apple and thorn skeletonizer, Hemerophila pariana, is as noted earlier, well established in portions of Westchester and Rockland Counties. An extension bulletin, prepared by the State Entomologist, has been published by Cornell University and will be widely circulated in the infested region in an effort to bring about a more satisfactory control of this insect until such time at least as its economic importance can be satisfactorily determined.

E.P. Felt,
April 23, 1918.

The pear thrips made its appearance in orchards about Hudson and Germantown during the week beginning April 14. In general the insects are not very destructive, and in only occasional pear orchards was appreciable damage noticed. If weather continues cold injuries by the pest may be more severe.

In the vicinity of Geneva the tarnished plant bug appeared on April 5, and various aphids of bush and tree fruits hatched as follows: the currant aphis April 5; the grain aphis and rosy aphis of apple April 14 and 17 respectively; and the cherry aphis April 20.

The prevailing low temperatures and short summers of the two past years have exerted a noticeable influence on the rate of development and multiplication of the San Jose scale. Breeding experiments show that there were only two generations, and the numbers of the second generation were greatly reduced by the low temperatures beginning with the last week of September and which continued through the remainder of the autumn.

Records for the past sixteen years show that the larvae of the San Jose scale may be expected to appear during the period of June 12 to July 5, which are the earliest and latest dates. In 1917 the young scales were not detected until July 15.

In the field of spraying, especially of apple and pear orchards, the most noticeable change is the adoption by increasing numbers of orchardists of the delayed dormant application in preference to the so-called dormant treatment.

P.J.Parrott,
April 22, 1918.

Quite a large number of Aporia crataegi were found this year. The flat-headed hemlock borer was killing some hemlocks on the estate adjoining the eastern parkway in the vicinity of Bronx Park. Many fine hemlocks were dying, we caused many trees to be destroyed, several hundred in number, the bark in some instances was literally full of larvae. We hope for equal success in this matter that Mr. Merkle secured in the Bronx a few years ago, where he cut infested trees, had the bark stripped and burned before the beetles emerged, but of course it is quite impossible to get the whole of infested trees, yet the borers were so reduced in numbers that natural parasites produced results that justified the work.

Geo.G.Atwood,
April 10,1918.

OHIO.

As part of a constructive reorganization program, Dr.Herbert Osborn of the State University has been appointed an Associate on the staff of the Experiment Station. The University authorities are closing arrangements for the appointmentof an extension entomologist and we are hoping for his assistance throughout the season. The station hopes to employ a few of the undergraduate students of the University as field helpers during their summer vacation and by combining effort with the other entomological bureaus of the state we hope to get essential programs handled though there will be severe curtailment of research.

The papers and reports dealing with entomology and spraying practice, read before the State Horticultural meeting January 29-30, were given closer attention than usual, showing a most gratifying alertness on the part of our fruit growers.

In our monthly bulletin we ran articles on greenhouse insects in the December, January and February numbers and an article on cankerworms in the March number. Females of the cankerworm moths were noticed appearing in great numbers in orchards about Wooster the last two weeks of March which were very spring-like. Unless a severe cold spell catches the newly hatched larvae we expect them to be quite destructive over several counties in northeastern Ohio. An article on ox warble flies abstracted from an article by Mr. Mote in the Ohio Journal of Science was published in the January number. Articles on important clover insects appear in the April and May monthlies. Besides extension matter, these

articles record many tests of control methods made by us and statement of results. Aphids are appearing numerously on apple buds in southern Ohio.

We have been spraying the galls of the chrysanthemum midge, Diarthronomyia hypogaea, with4C per cent nicotine sulphate diluted with 500 parts of water and fish-oil soap solution and find that practically all adults from sprayed galls die almost immediately after emergence if the spray was applied not more than three or four days previously. This seems to promise a fairly satisfactory method of control.

Two species of Bibionid flies and a Sciaria captured in wheat fields have been recently received for identification, the inquirers evidently being on the alert to discover Hessian fly; also specimens of Trombidium sericeum came to us from a wheat field presumably under the suspicion that they were young chinch bugs.

The work with grapeberry worm in northern Ohio will be handled largely by the Bureau of Entomology as was the case last year. Through a visit of Mr.J.J.Davis of the Bureau, we have reached some mutual understandings regarding exchange of observations on Hessian fly and wheat jointworm.

I have not learned of any one in our state being unable to obtain insecticides or spraying machinery though shipments are sometimes delayed and orders are tardily filled. Shortage of labor is a greater handicap to spraying being done than scarcity of materials or machines.

Many inquiries come to us regarding the merits of calcium arsenate and the dust sprays. On the basis of experiments of our own and published evidence by others, we endorse calcium arsenate in the usual combinations for spraying potatoes and apples, the potash-sulphur dusts for dormant spraying but not in combination with arsenicals for use on foliage, and the lime-sulphur dusts as worthy of cautious trial in the usual arsenical combinations. The sulphur arsenical compounds for orchard spraying have given us results through two seasons comparable with the liquid sprays against codling worms, but control of fungus diseases has not been so good as with liquids.

H.A.Gossard,
April 17, 1918.

OREGON.

A determined effort will be made this season to lessen the annual loss due to insect pests of field crops in the vast grain areas of eastern Oregon by launching a determined campaign against the grasshoppers and cutworms. The division of honors as to destructiveness between the grasshoppers and cutworms and the wireworms is practically even, but most unfortunately our farming practices in eastern Oregon do not permit of any especially effective work against wireworm injury. Mr.B.G. Thompson is now in charge of the grasshopper survey work in eastern Oregon and is rapidly covering the ground making the preliminary survey of the egg deposition areas. The vast areas to cover in the east-

ern Oregon country and poor transportation facilities make the task an enormous one. Mr. Reeher, also a Federal field entomologist, will work primarily with the clover seed insect pests in western Oregon and both Mr. Thompson and Mr. Reeher will be ably assisted by members of the Federal entomological station at Forest Grove. Mr. Thompson reports that the County Court of Malheur County has appropriated $5000 for conducting the grasshopper campaign and he finds a very ready cooperation among all classes of people in that district. The clover seed insect drive will be practically under the supervision of Mr.C.W.Creel, in charge of the federal station at Forest Grove. In so far as the funds will permit the Department here will assist both in the eastern and western sections in the final drive against the pests.

Surveys taken at the present time indicate a very heavy infestation of aphids in the apple orchards. Both Aphis sorbi and A. pomi are present in numbers and everything is favorable for their increase. Aphis avenae, another apple orchard pest, is extremely scarce in the Valley this year. Field vetch and field peas show an infestation of the pea aphis, Aphis piri, but the presence already of some natural enemies indicates that should normal weather conditions prevail the natural enemies will be able to handle the situation.

From reports coming in it would appear that more than the usual amount of American foul brood is present in Oregon this year, though possibly it is only due to an unusual amount of interest in honey production in the State. In portions of eastern Oregon, many complaints are coming from injury to honey bees by poisoning, due to spraying of fruit trees in blossom. So serious has this situation become as to discourage many beekeepers from attempting to continue in the business. Investigations would indicate that growers are not ignorant of the effect of this spraying on honey bees, but due to a lack of sufficient power spray outfits, many growers are attempting to use one outfit necessitating the beginning of the spraying operations earlier than is warranted.

A.L.Lovett,
April 13,1918.

PENNSYLVANIA.

The trustees of the Pennsylvania State College recently authorized establishment of permanent field research laboratories for the study of insects and diseases affecting crops,with an entomologist and a pathologist comprising the staff of each laboratory. The writer has been transferred from extension to research, in general charge of entomological research, and for the present is to be located at Bustleton, Philadelphia county laboratories, as entomologist, to take up truck crop insects. M.D.Leonard of Cornell University is located at Girard, Erie County laboratory, as entomologist, to take up vegetable insects. S.W.Frost of Cornell University is assigned as entomologist of Arendtsville, Adams county laboratory to take up fruit insects. Permanent apparatus and equipment are installed at eash laboratory and work is under way.

C.H.Hadley,

TENNESSEE.

From this state we have to report the first outbreak known to the writer of the strawberry weevil, Anthonomus signatus, in Tennessee. Specimens and information in regard to this outbreak have just been received. The strawberry growers in the section of Lauderdale and Crockett counties near Ripley and Bells, claim that fully one-half per cent of their crop has been sacrificed by the work of this weevil.

Strawberries throughout the state have varying amounts of strawberry root louse, Aphis forbesi, but in no place in the state has the infestation proven serious for the past year.

Unusual attention has been directed to the orchards in applying both the dormant and the first growing season spray, especially is this true in the middle and western part of the state where the prospects for the fruit crop are good.

We find that the corncribs and granaries which are open are infested with the grain weevils, either Calandra granaria or oryza. Where the closed bins and fumigation are used, little if any results of injury are found from the attacks of these insects.

Due to the severe winter weather and changeable spring, there has been a heavy loss of honey bees throughout the state where no attention has been directed to the proper wintering of the bees.

Several eggs of the warble fly, Hypoderma lineatum have been taken from the heels of cattle during the past and present week.

From Belgian hares grown at Knoxville, several sucking lice were found doing injury. Several young hares are already dead, apparently from the attack of these lice, and others are in a highly weakened condition. This is the first notice of a serious pest of this nature found in the state.

G.M.Bentley,
April 23,1918.

TEXAS.

Heavy losses have been suffered in this state by the sweet potato weevil. These losses have been more pronounced since January first as the weevils have been found extensively in sweet potato houses.

The chinch bug has been found very prevalent in the northern section of the state. A campaign of eradication has been inaugurated by the Extension service. So far very favorable results have come from this campaign.

An unusual number of gardens have resulted in inquiries concenning control of cutworms which are unusually severe this year.

The most striking example of insect injury is that of the false wireworm. This insect has not been reported in the past seven years but this year is proving very injurious to all garden crops. Very often the injury done by this pest is mistaken by that of the cutworm.

F.B.Paddock,
April 11,1918.

WASHINGTON.

In this state I have already seen numbers of a caterpillar, Malacosoma, hatching within the last two weeks. Single peach trees have as high as thirty different egg masses. Also noticed on Delicious apple and cultivated rose bushes.

I am just making a long, formal report to Mr.Walton on the danger of an epidemic of the Coulee cricket which I will not attempt to digest here.

A.C.Burrill,
April 18,1918.

WISCONSIN.

It is as yet to early to accurately estimate the entomological situation in Wisconsin. The long, steady winter, without a single break-up until continued warm weather, has no doubt been exceptionally favorable for insect survival.

Prof.H.F.Wilson reports that plant lice are already sufficiently numerous on tree buds to indicate a heavy infestation under favorable conditions. Heavy rains have so far been lacking. If they come later a large number of the lice will no doubt be destroyed.

He also reports that the first cabbage buterflies appeared on the 13th of April and a number were flying on the 15th.

Reports are coming in from many places in the state as to the loss of young clover and alfalfa last winter, most of which is attributed to freezing. In certain sections more observant people have connected this loss with the excessive number of grasshoppers found in the fields last fall, pointing out that in the spots where the grasshoppers ate the young alfalfa and clover it died out. While, for example, around chicken coops, where the grasshoppers were kept down by the chickens, it lived over in fine shape. The grasshoppers were very uniformly distributed over the state last fall and quite seriously abundant. Everything in the climatic conditions has been favorable for the survival of the eggs. Investigations will be taken up a little later to see what this survival has been.

E.D.Ball,
April 19,1918.